



# Centerline

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## Viewpoint: NCDOT Operations Through the Years

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The Operations side of the North Carolina Department of Transportation is involved in all aspects of managing 78,350 miles of highways in North Carolina - including the

design, construction, and maintenance of the highway system. Our environmental concerns begin with defining the need and purpose of the project through design, construction and maintenance. We have the ultimate responsibility to ensure the highway facility is providing the traveling public the service they need and expect.

One major difference between Operations and other branches of the department is we are never through with a project. Operations' managers and employees are in continuous contact with the public and assume the liability of maintaining a safe and effective facility.

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## Thorpe Named Branch Manager for PDEA

By: V. Charles Bruton, Ph.D., Manager  
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Dr. Greg Thorpe was named Branch Manager for the Project Development and Environmental Analysis Branch on August 28, 2002. Greg was officially introduced to the PDEA staff on Thursday morning August 29, 2002 by Deputy Secretary Roger Sheats and Mrs. Janet D'Ignazio, Chief of Environmental Planning. Dr. Thorpe will direct and manage the Branch's 161 employees which include Administrative Staff, Project Planning, Office of Natural Environment and Office of Human Environment.

Dr. Thorpe comes to PDEA from the Division of Water Quality, DENR where he held the position of Deputy Director. In this position he was responsible for the operations oversight and direction of the State's programs for surface and ground water protection, construction grants and loan funding, and the Division's environmental laboratory operations. Throughout his professional career he has served in other supervisory roles related to water quality and storm water programs for North Carolina.

Dr. Thorpe earned his Ph.D. in Zoology with a concentration in Aquatic Toxicology from Duke University. He received a Bachelor of Science Degree in Zoology/ Fisheries Biology and a Master of Science Degree in Zoology/Physiology from Colorado State University.

Greg is no stranger to PDEA. He has been

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My first experience with the environmental impact on Operations occurred in 1973 when the N.C. Sedimentation and Pollution Control Act was passed. The effect of our day-to-day field activities on the environment became immediately apparent. I was personally involved in training our field employees on the “do’s and “dont’s” about sedimentation control. The Chief Engineer’s Office became a very strong supporter of sedimentation control and demanded 100% support from all employees. It was very obvious that we needed to change our methods and procedures of controlling storm water runoff. The establishment of ground cover as quickly as possible and the slowing down of water flowing in our ditches became a major area of concern. Our goal was to not only prevent erosion of roadways but to contain all sedimentation within our project limits.

As a result of our field personnel’s efforts, in 1992 the Sedimentation Control Commission delegated the authority to the N.C. Department of Transportation for self-administration of the 1973 act. This has been a major success story from the beginning. Our employees responded to the challenge.

As the department moved through the 1980’s, the emphasis on environmental awareness increased. The federal and state regulatory agencies began to gear up to establish policies and procedures to implement federal and state laws. Three other major acts affected our operations. The National Historic Preservation Act of 1966, the National Environmental Policy Act of 1969 (NEPA), and the Endangered Species Act of 1973 would change and control our field operations in the future. I was appointed to serve on a task force to establish minimum criteria to assist the department in meeting the environmental laws and procedures. The Minimum Criteria Law was enacted in 1989 and amended in 1990.

The 1990’s will be remembered as a time of changing the department’s directions and goals. Our goal was not only to get the work accomplished as soon as possible but to get it done in an environmental friendly manner. Environmental concerns became a major part of planning our activities and were issues we addressed FIRST – NOT LAST.

The list of new and environmental milestones affecting the department is long. It starts with a Solid Waste Management and National Pollution Discharge Elimination System (NPDES) Permit. It continues with wetland and stream mitigation, trout water variances, state storm water permits and environmental assessments on all of our activities.

In the mid 1990’s it was apparent that our field managers needed assistance. We began to establish environmental officers in all 14 highway divisions. I can assure you that the Division Engineers are dependent on and confident in these most critical and effective positions.

Our effort to respond to and clean-up natural

disasters is another major area of responsibility in which we are involved. In the past, we had failed to address environmental concerns in this area. Until Hurricane Floyd, our primary goal was to re-establish our highway system as soon as possible. This is still our goal; however, we have learned that how we rebuild roads and replace washed-out pipe can have a long-lasting effect on the environment. We have to perform our work in an environmentally sensitive manner. We are working with all of the regulatory agencies to establish a Best Management Practices (BMP) agreement to accomplish this. Hopefully, this agreement will be signed soon by all agencies.

Earlier this year, Operations was asked by the department’s Planning and Environment Office to develop an Environmental Stewardship Policy for the Department of Transportation. On February 7, 2002, the Board of Transportation adopted this policy. I believe this further demonstrates the field operations’ awareness and dedication to the environment.

I would like to take this opportunity to express my appreciation to all our managers and employees for their efforts in protecting the environment. Also, I would like to thank the Raleigh based staff for all of their assistance when we call upon them. Without their knowledge and dedication, our efforts would have fallen short of our goals.

I want to assure the citizens of North Carolina that the Chief Engineer’s Office will continue to provide the needed transportation services while meeting our environmental commitments.

### ***Get Well Soon Michael!***

We are happy to report that Michael Turchy, a member of the TIP Management Team, is successfully recovering from a recent surgery. Michael our entire staff wishes you a full recovery and look forward to your return.

### ***Goodbye Tim Savidge!***

Tim, a valuable member of the Section 7/Special Studies Team has announced his resignation from our office effective October 25, 2002. Tim has been a key staff member for NCDOT for 10 years. He is a well trained Natural Resources Specialist, but has developed expertise as one of the Southeast USA leaders in molluscan biology.

Tim will join The Catena Group, a private Consultant in the Triangle area. We wish you the very best in your new position. We will miss you!

## MARK'S CREEK MITIGATION SITE

By: Byron Moore, P.E., Natural Environment Transportation Engineer  
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NCDOT is very conscientious of the role it plays in offsetting unavoidable environmental impacts that are caused by the development of improved transportation facilities. Mark's Creek is part of this mitigation effort. This site in Wake County is being developed to offset wetland impacts caused by the new Knightdale Bypass.

Phase I of this project consists of almost 70 acres of upland buffer and wetland preservation and enhancement. NCDOT obtained enhancement credit by planting wetland tree seedlings in degraded wetland areas of the property. The wetland enhancement portion of Phase I was completed, except for required monitoring, in March 2002.

Phase II consists of wetland and stream restoration and creation. Phase II construction is slated to begin in fall 2003.

Phase II will comprise approximately 3,250 feet of stream restoration. The wetland component is made up of 8.5 acres of restoration and 1.6 acres of creation. Stream restoration will involve restoring several stream threads located in the bottom of an old, drained pond adjacent to the new Bypass. The pond dam will be removed during construction with the restored stream threads and wetlands being constructed in the pond bottom. Natural stream design techniques were utilized in the design of the stream. Structures such as rock vanes, log vanes, and rootwads will be used to help stabilize the stream as well as improve aquatic habitat.

Numerous people within NCDOT have been instrumental in the development of the Mark's



*Rock Cross Vane*

Creek mitigation site. Site acquisition, mitigation plan development, construction plan development, administration of construction contract, vegetative planting of site, installation of groundwater gauges, and continued monitoring of the site all require the expertise of several units within the Department.

The mitigation process has become another facet that NCDOT has accepted as part of its responsibility to the people of North Carolina. The Department has shown through projects like Mark's Creek that it is committed to providing modern highway facilities while concentrating on minimizing environmental impacts.

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actively involved with a number of our staff over the past year working as a key member of the Coordination Team with the primary mission to improve the permit and mitigation processes as they relate to transportation issues. He has also worked closely with other staff from NCDOT, USACOE and NCDENR to implement the Ecosystem Enhancement Program (EEP) which will be fully implemented by January '2005.

Greg, our Branch congratulates you on your appointment and welcomes you as an employee of NCDOT. We look forward to having a person of your integrity and environmental knowledge and management skills join our agency.



*Drained Pond On Mark's Creek*

**ECU Researchers Complete Study of NCDOT Mitigation Sites**  
**Adapted by Gordon Cashin from the Executive Summary**  
**by Richard D. Rheinhardt and Mark M. Brinson**  
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Two researchers from East Carolina University (ECU) recently completed a study on the effectiveness of NCDOT wetland mitigation sites. This study was sponsored by the Center for Transportation and the Environment (CTE) at N.C. State University with partial funding by the U.S. Department of Transportation and NCDOT. NCDOT's goal in funding this study was to obtain an objective analysis from external, respected wetland scientists on the effectiveness of our mitigation program. The researchers, Richard D. Rheinhardt and Mark M. Brinson, approached the project with the objective of helping NCDOT and wetland regulatory agencies develop a framework to improve NCDOT's compensatory mitigation, and to benefit wetland restoration overall. During Phase I of the study, Rheinhardt and Brinson evaluated 49 NCDOT wetland compensatory mitigation sites and 11 reference sites in 1999. Seventeen of the larger sites consisted of more than one type of mitigation (restoration, creation and/or preservation). In total, 71 mitigation parcels (approx. 3000 acres) were evaluated to assess the likelihood that mitigation sites would achieve some level of structure and functioning similar to natural, self-sustaining wetland ecosystems and to provide recommendations for improvements. A Phase 2 study analyzed five of the compensatory mitigation sites in-depth.

From the researchers' perspective, ecological success was related to whether or not natural geomorphology has been successfully restored. Rheinhardt and Brinson found that sites from which fill was removed were generally successful. Sites in which water impediment structures were constructed showed mixed results for vegetation survival, presumably because it was difficult to determine how wet to make a site. Wetland creations were generally unsuccessful because most all involved excavating soil to reach the underlying saturated zone, thus inhibiting growth of vegetation on sub-soils. Although the sites were immature, it appeared that many created wetlands would not likely resemble historic ecosystems over the long term. Of the 71 compensatory mitigations examined, 26 were judged to be ecologically successful, 19 were preservation sites (automatically judged to be successful), 9 were judged to be unsuccessful, 10

lacked sufficient data (mostly hydrologic data) for judging success, 4 sites were too young to predict the outcome for vegetation survival, and 3 were undergoing construction at the time of site visits. The researchers found that alteration of and failure to restore natural geomorphology was the major factor associated with the lack of mitigation success, regardless of whether success was defined by permit success criteria or by ecological success. Compensatory wetland mitigation involving restoration and creation appears to have gravitated toward relatively narrow sets of success criteria for hydrology and vegetation, with little room for flexibility. In contrast, no standards are being used for soil condition. These success criteria and standards should undergo critical examination to see if they are consistent with no-net-loss wetland policies, and if alternative measures should be taken.

The researchers also encountered problems with various definitions (restoration, preservation, enhancement, etc.) that are not compatible with current scientific understanding of ecosystem functioning. This has led to avoiding the potential for improving the condition of severely altered wetlands because they meet the jurisdictional definition in spite of a highly degraded condition. Elsewhere, socioeconomic limitations may prevent complete restoration. In such cases, partial restorations may be better than none at all. In general, reference sites have been little utilized to design restorations and to gauge success. Depending on initial conditions, the restoration of wetland structure and function may take many decades to achieve maturity.

The researchers recommended that regulatory agencies should be willing to accept success criteria based on data from reference wetlands. The agencies should also provide mitigation credit for establishing reference sites and conducting long-term research in comparing them with a variety of restoration practices. This would encourage long-term research on restoration sites, whereas at present all monitoring stops once permit conditions have been met.

The results of the study were presented to CTE in two reports. Links to these reports can be found at: [http://itre.ncsu.edu/cte/rip\\_wetlands.html](http://itre.ncsu.edu/cte/rip_wetlands.html).



## North Carolina DOT Looks to Canada for Wildlife Crossing Solutions

By: V. Charles Bruton, Ph. D., Manager  
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Three NCDOT staff members, Debbie Barbour, Hal Bain, and Charles Bruton recently attended a Wildlife Crossing Structure Field Course in Canmore and Banff, National Park, Canada. The workshop attended by 55 participants was sponsored by the Western Transportation Institute (WTI), Center for Transportation and the Environment (CTE), US Forest Service and FHWA. Transportation Engineers, FHWA Division Administrators, and resource management professionals from Alaska, the Western USA and Southeast USA were brought together to work out what to do and what not to do when constructing wildlife crossing structures. Ms. Katie McDermott, Technology Transportation Program Director for CTE at NC State University also participated. Ms. McDermott is publishing information regarding the workshop on the CTE Wildlife, Fisheries, and Transportation Gateway Web Page [www.itre.ncsu.edu/cte/gateway/index.html](http://www.itre.ncsu.edu/cte/gateway/index.html).

Workshop participants were exposed to 1 ½ days of classroom presentations by a number of wildlife crossing experts. Dr. Tony Clevenger, a Canmore based wildlife research ecologist, talked on the effectiveness of the Transportation Canada Highway Wildlife Structures. He told conference attendees that determining the success of Banff's underpasses and overpasses is no easy tasks. Among the more important criteria for success is maintaining habitat connectivity and ensuring that the species biological requirements are met. According to Dr.

Clevenger "there will never be a perfect crossing structure for all species of animals". (Rocky Mountain Outlook, 9/12/02)



Wildlife Overpass, Banff National Park

During the field portion of the workshop, a number of crossing structures were visited in the park. Wildlife overpasses and open space underpasses, several fencing



Participants viewing tracks on top of the wildlife overpass, Banff National Park.

designs, metal and box culverts and creek bridge pathways were examples of wildlife mitigation that have been incorporated into transportation planning, design, construction, and performance monitoring in Banff. According to Bruce Leeson, Parks Canada Senior Environmental Assessment Scientist, wildlife crossing structures in Banff National Park have been highly successful. Banff has approximately 25,000 vehicles traveling in and/or through the Park on an average summer day so some type of mitigation is essential. Lesson reported "that between November 1996 and January 2002, there were 41,000 passages of animals of the approximate size of a coyote or larger recorded in 21 underpasses and two overpasses." (Rocky Mountain Outlook, 9/11/02)

The North Carolina delegates hope to learn from the Canadian experience in mitigation for wildlife transportation conflicts. The workshop definitely advanced context sensitive design as an integral part of FHWA's environmental stewardship and streamlining efforts. Future highway projects in North Carolina will be carefully analyzed to see if wildlife crossings are needed and feasible to construct, and if so, what type design is likely to be an effective means of mitigation. Injury and mortality to both wildlife and human vehicle occupants and the cost/benefit information concerning various mitigation techniques needs to be understood.

### DETOUR

If you were presented this travel obstacle as a highway planning engineer, what course of action would you take?

- A. Call park rangers to come and "scare" wild sheep off the road.
- B. Become a full-fledged biologist and say the heck with roads.
- C. Catch and sell the sheep to the zoo.
- D. Provide adequate wildlife crossings, overpasses, and fences to protect wildlife.



Charles Bruton, along with Hal Bain and Debbie Barbour attending a Wildlife Crossing Structure Field Course, caught this view of Mountain Sheep crossing the Highway in Banff National Park, Canada.

See Answer on Page 11

**Spotlight Article: On-Site Mitigation**  
**An efficient and low-key process that delivers big-time results**  
By: Ed Lewis, Natural Environment Transportation Engineer  
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Over the last few years, the North Carolina Department of Transportation's (Department) Office of Natural Environment has explored many avenues in providing viable wetland and stream mitigation projects. Wetland and stream mitigation is required to offset the unavoidable impacts to these resources resulting from the Department's construction of transportation projects. One of the Department's goals has always been to maximize the return of every dollar invested in the mitigation program. Several avenues are utilized to provide mitigation with this goal in mind. These avenues are:

1. the "search-feasibility study-mitigation plan"
2. the "full delivery program"
3. the "purchase credits from the Wetland Restoration Program"
4. the "on-site mitigation"

Of these four, the on-site mitigation process is the least glamorous, but this low-key approach packs a powerful punch in delivering mitigation credits per mitigation dollars spent.

On-site mitigation describes the situation where the Department has the opportunity to restore a contiguous part of the same natural system impacted by the construction of a transportation project. The other three mitigation processes require the search of a river basin or an area identified by an 8-digit HUC code for degraded natural system sites. These sites are then formally reviewed for feasibility, a mitigation plan and design are developed, and the project is constructed. There is no formal search for the on-site mitigation. During the project development phase, Department biologists scour proposed construction corridors identifying and mapping flora, fauna, streams, wetlands, and buffers as part of the NEPA/404 merger project development process. It is during this stage that degraded natural systems can be identified as potential on-site mitigation projects. As the NEPA/404 merger process continues through the selection of the

preferred alternative and the avoidance and minimization phase, on-site mitigation techniques are identified and incorporated into the Section 404 permit drawings by the Hydraulics Unit for review. These proposed techniques are also included in the construction plans prepared by the Roadway Design Unit. The project can be implemented at a lower cost than if it was a stand-alone project since there is no up-front search, feasibility, or plan costs. In addition, many of the on-site mitigation efforts do not require as stringent after construction monitoring as the other processes do, which keeps costs down. However, the real value provided by on-site mitigation is in the credit ratio of 1:1. That is, for every acre or foot of natural system impacted by a transportation project the Department is required to provide that same amount in mitigation. Compared to the other three mitigation processes which can deliver credit ratios of 2:1 or higher, on-site mitigation is a bargain.

The Department actively pursues all opportunities available to provide mitigation for unavoidable impacts to natural systems. On-site mitigation is a low-key but highly effective and efficient method of providing mitigation for the Department's transportation program.



## Engineering the Environment – Providing Fish Passage at Pipes and Culverts

By: Diane K. Hampton, P.E., Division 9  
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*DEO Perspective: Featuring an article from a Division Environmental officer. This quarter's segment is brought to us by Division 9, located in the Central Piedmont Region of North Carolina.*

Division Nine has been working very hard to provide fish passage in culverts. Through working with Ron Linville and Joe Mickey of the North Carolina Wildlife Resources Commission, (WRC), we have been installing “fish friendly” structures. The process of achieving harmony with the fishery environment is multifaceted. There has to be a balance between the hydraulic engineering of culvert design and the needs of the biological community. Most hydraulic engineers are taught to provide maximum efficiency, flood capacity, and minimize backwater effects all the while trying to minimize cost, and keep the velocity reasonable. From my past experience, very little is said in hydraulic engineering classes about how the fish feel about all this. These criteria often conflict with the goals of natural channel design. Now, having been on both sides, I am enjoying trying to tie these two very different ways of thinking together.

In order to achieve balance, we have to venture into the process in small steps. The first phase involves education and understanding. The engineers need to know why fish passage design is



*Fish Passage Culvert*

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## Endangered Spiny Mussel Discovered by NCDOT in the Dan River in North Carolina.

By: Tim Savidge, Unique Technical Specialist  
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NCDOT biologists discovered a spined mussel in the Dan River in Stokes County North Carolina in October 2000. Three spined mussel species occur in North America along the Atlantic slope. These include the James River spiny mussel (*Pleurobema collina*), the Tar River spiny mussel (*Elliptio steinstananna*) and Altamaha River spiny mussel (*E. spinosa*). Both the James River spiny mussel (JSM) and the Tar River spiny mussel (TSM) are protected as Endangered under the Endangered Species Act of 1973 as amended (ESA). Genetic analysis was performed on the specimens from the Dan River to determine the taxonomic relationships of the spiny mussels. This work was conducted at the University of Alabama.

The preliminary genetic analysis revealed that the spiny mussel occurring in the Dan River is the same species as the JSM, with slight variation, which is attributed to between-population variability. The results also indicate that the JSM and the TSM are distinct species, but closely related and the placement of these two species in separate genera is in error.

Further analysis is being conducted to determine into which genus (*Pleurobema*, or *Fusconaia*) the JSM and the TSM should be placed. The analysis also supports the placement of the Altamaha spiny mussel in the genus *Elliptio*, and not in the same genus as the other two spiny mussels. This suggests that the presence of spines is a convergent characteristic, which was speculated by Johnson (1970).

Previously the JSM was believed to be endemic to the James River system, with a widespread distribution within the basin. When the Recovery Plan for this species was adopted, the JSM was believed to have been extirpated from 90% of its historic distribution. The discovery of “new” populations is listed as a recovery goal for this species.

Since the discovery of the JSM in the Dan River in October 2000, NCDOT has embarked on

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important. One thing they need to know is that fish are the hosts for the endangered mussels and their passage is critical for the mussels to inhabit desirable areas of the creek. On the other hand, the biologists need to understand the flood safety and foundation stability requirements of the bridges and culverts and why they are designed as such. In order to help the engineers understand the biological requirements of culverts, we invited Joe Mickey of the WRC to be our guest speaker at one of our recent quarterly staff meetings. He gave a very enlightening presentation on this topic, detailing how the depth, velocity, and roughness played a role in fish movement and how it affected various species. Also, many (over 20 in the last year) of our engineers have been attending the Land Quality seminar in Hickory where fish passage and other environmental considerations are discussed. Several more speakers and educational opportunities are planned in the future.

The second step in achieving desired results involves coordination with the resource agencies. The role as Division Environmental Officer, DEO, is important as we guide the Department of Environment and Natural Resources, DENR, the United States Army Corps of Engineers, USACE, and the WRC on visits to our projects for compliance inspections. One issue that has been in the spotlight lately is the construction of sills on box culverts. We had a design recently on a TIP project that called for sills on both the upstream and downstream ends on one outside barrel. The double sills created a “bathtub” of stagnant water where mosquitoes were breeding heavily. The neighboring homeowner was complaining about the problem. With the outbreak of West Nile virus recently, we are very concerned about this problem. We asked Dr. Bruce Harrison of DENR, a mosquito expert, to visit that site and provide guidance. Through coordination with these agencies and our hydraulics unit, we have eliminated downstream sills on this and future designs.

The final and most enjoyable phase of achieving fish passage is seeing how the floodplain benches, sills, baffles or other structures actually work during low flow conditions to allow fish passage. WRC has been very instrumental in working with us in the field to demonstrate the



*Low Flow Conditions*

desired floodplain bench designs and rock weir structures. The requirements for pipe burial and floodplain benches are needed to allow low flows to pass through during these drought conditions that we are having. We also know that the strict erosion control measures we employ near creeks have allowed fish to carry on their normal activities with little or no interruption. I recently saw a spawning bed right next to one of our culvert construction jobs, with a bream guarding the nest. With WRC’s guidance, we have been able to recreate Mother Nature by creating the best flow conditions upstream and downstream of the culverts. Floodplain benches have become standard on our TIP and Division projects. Raising the high flow pipe and burying the low flow pipe have become routine on our Division projects. Riprap usage has been scaled back to the toe of slopes and steep embankments, and minimized in the channel bottoms. Natural materials and matting are being used more often. Live staking and root wads are being used increasingly. After construction, nothing is more pleasing than to visit the site and see frogs jumping, fish swimming, and creeks teaming with life.

In summary, in order to achieve balance between efficient engineering and the environment, we, the NCDOT, need to continue to work closely with all of the resource agencies from conception of design through final construction.



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an extensive survey of the Dan River Basin. Personnel from the USFWS NCWRC, NC State University School of Veterinary Medicine, NC Natural Heritage Program and Virginia Polytechnic Institute (VPI) assisted at various times during these surveys. Most of the survey efforts have been concentrated in Stokes, Rockingham and Caswell Counties. Greater than 380 man-hours of survey time have been expended by NCDOT (and volunteers from other agencies) during this endeavor. This does not include survey efforts conducted by the WRC and other agencies independent of NCDOT's efforts. In addition to the mainstem of the Dan River, the JSM was also discovered in the Mayo River a tributary to the Dan River at approximately River Mile 109 in northwest Rockingham County. The JSM has not been found in any other tributaries to the river. In fact, the majority of tributaries in the Dan River drainage appear to be devoid of a mussel fauna.

Although surveys in the watershed are not totally complete a range of the JSM in the Dan River has been established. This apparent range (~ 36 river-miles) in the Dan River, extends from below the North Carolina/Virginia border near the first bridge crossing in North Carolina in northwest Stokes County down to at least below the town of Danbury in central Stokes County. This population is the largest one currently known to exist for this species. The JSM was also found in the South Fork Mayo River in Virginia during recent surveys conducted by NCDOT and VPI. Subsequent survey efforts will continue in the Dan River Basin in Virginia as a component of graduate research through VPI.

The population data was gathered for the

preparation of a Biological Assessment (required under Section 7 of the Endangered Species Act of 1973) for two bridge replacement projects over the Dan River. Impacts to this species and its habitat will be minimized to the fullest extent practical, however the bridges cannot be replaced without some unavoidable impacts. It is anticipated that between 20-30 individuals (10-15 at each bridge) occur in the project footprints. NCDOT is proposing to relocate these individuals to appropriate habitat prior to construction. Conservation measures, such as riparian buffer preservation have also been initiated by the Department to help offset some of the anticipated impacts to this species and its habitat.

Through NCDOT's efforts, the largest population of the federally endangered James River spinymussel was discovered. Although impacts to this population will occur as a result of bridge replacement projects, NCDOT is taking a number of initiatives to ensure the continued viability of this species in the Dan River.



*Spiny Mussel in the Dan River  
Photographed by John Alderman.*

#### **Hat's Off to LeiLani Paugh and Phillip Todd**

Congratulations to both of you on your recent promotion! LeiLani and Phillip have been selected as the Environmental Supervisors in the Mitigation Implementation Team directed by Bruce Ellis. Please join us in congratulating LeiLani and Phillip as they transition into these new roles.

#### **Hat's Off to Elizabeth Lusk, Lindsey Riddick, and Alice Gordon**

Congratulations is also extended to these three staff members on their recent promotion! Elizabeth and Lindsey have been selected as the Environmental Supervisors in the TIP Project Management Team directed by Randy Turner and Alice Gordon has been selected as the new Permit Affairs Specialist in this Team. Please join us in congratulating Elizabeth, Lindsey, and Alice as they assume their new roles.

#### **Hat's Off to Jerry Parker**

Congratulations Jerry and Deborah! Environmental Specialist, Jerry Parker and his wife, Deborah, have a new addition to their family. Deborah gave birth to a baby girl, Sydney Jervonne, on July 22, 2002. We wish them much happiness.

#### **Hat's Off to Erika Mortenson, Hal Bain, Lynn Smith, and Michael Turchy**

Erica Mortenson, Hal Bain, Lynn Smith, and Michael Turchy were conducting field surveys near Lake Waccamaw in Columbus County recently when they noticed something not quite right in the driveway of a home they had just passed. An elderly gentleman had fallen from his wheelchair and was lying on the ground unable to get up. The group helped the man back into his wheelchair. The man was apparently alright, but extremely grateful and thanked the group for their assistance.

**NCDOT Reforestation Practices**  
By: Locke Milholland, Environmental Specialist  
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Reforestation is an integral part of NCDOT mitigation. Forested wetlands and stream buffers are desirable for their high water quality and habitat values. The Neuse River Basin, Tar



*Planting of Trees*

Pamlico River Basin, and temporary Catawba River buffer rules protect the 50 foot riparian zone from direct impact.

Established, mature forests require many decades and several secessional stages before formation is complete. It is therefore the goal of DOT's mitigation strategy to be well educated in reforestation processes to reduce the time required in achieving the most desirable ecological state.

In the case of restoration, after the site location has been determined, measures are taken to return the land to a desired natural state. A typical tract would be an abandoned agricultural field. In such a case surrounding natural areas with mature vegetation would serve as a model for the reforestation plans.

With the diversity of North Carolina's ecosystems, and the range of environmental aspects we are required to consider, it would be naive to think that a single site designer would know all that is needed to maximize the site potential. For that reason, the Natural Systems staff incorporates, as common practice, the cooperation of the Roadside Environmental Unit of NCDOT and recommendations from Division of Forest Resources (DFR) professionals. Consulting with the DRF Forester provides hands-on expertise in the mitigation site's region and can suggest management practices that will maximize the growth potential and efficiency in reaching the mature forested state.

With a plan in place, the sites are reforested with seedlings purchased through one of

the three nurseries in the state. The three nurseries are located in Goldsboro, Morganton, and Crossnore. The nurseries supply the coastal plain, piedmont, and mountains respectively. The locations of the nurseries allow for quicker delivery of endemic species than a single seedling source could provide. Seedlings grown in close proximity to the planting site are acclimated to the weather conditions and having a greater probability of survival.

Trained Division crews or contractors are typically responsible for planting the seedlings, working closely with the NCDOT Roadside Environmental Unit and the Division Environmental Officer. The watch does not stop there. For the next five years NCDOT monitors the site for successful reforestation. Monitoring criteria include, but are not limited to, stems per acre and species composition. This is to ensure an adequate number and type of tree thrive to produce the a mature forest.

The US Army Corps of Engineers (USACE) provides a second tier of watch. The USACE reviews NCDOT monitoring reports and conducts site inspections as a part of the checks and balances of the mitigation program. It is upon the shoulders of the USACE to make the final declaration of success. At this point, it is assumed that left to her own devices, nature can take care of the rest. After a few years of hard work by NCDOT and a few decades of work by mother nature, what was once a abandoned agricultural field can be turned into a thriving forest, providing numerous homes for wildlife, volumes of purified water, and hours of enjoyment for the people of North Carolina.



*Hardwood Forest Mitigation Site*

## Employee Spotlights

Cindy Roebuck is the Processing Assistant for the Office of Natural Environment under the direction of Dr. Charles Bruton. She came to NCDOT as a temporary employee in 1990 as an administrative assistant in the Environmental section. In 1992, Cindy was appointed to a permanent position in the PD&EA Branch, handling administrative duties in the front office. Cindy transferred to the central filing room in 1997. Here, she distributed environmental documents and handled the payroll for the Branch. Cindy held this position until January of 2000, when she accepted her current role within the Office of Natural Environment.

Her role in the Office involves coordinating the schedule of the Manager of the Office of Natural Environment, serving as a liaison for interoffice correspondence, distributing environmental documents through the Office, maintaining excel and environmental central files, and preparing for six month status report meetings.

Cindy is a native of Wake County, North Carolina. She currently lives in North Raleigh with her husband Chip and daughter Erica. In her leisure time, Cindy enjoys playing the piano, bowling, and painting. She has also taken up the hobby of scrap booking and is able to keep it full with enjoyable family trips to the Carolina Beaches and Mountains.

**Cindy Roebuck**



**Phil S. Harris**



Phil Harris is a Professional Engineer and serves as the Permit Tracking Mitigation Engineer for the PDEA - Office of Natural Environment. With some experience in the private sector, Phil joined the Department in 1993 as a Project Planning Engineer in the Planning and Environment Branch. He worked in the Consultant Unit until 1997 at which time he became the Wetland Mitigation Coordinator. Phil assumed the position of Natural Systems Unit Head in 1999.

In 2000, Phil attained his current position where he assists the Manager in day-to-day operations of the Office of Natural Environment. Phil assists the five Unit Heads to insure mitigation, permitting and natural resource activities are accomplished in a timely manner. He also plays a key role in administering the offices on-call consultant contracts.

Phil is originally from Washington, North Carolina. He is a graduate of North Carolina State University with a Bachelors of Science degree in Civil Engineering. Phil went on to receive a Masters in Coastal Engineering at the University of Florida. While his educational career is split, Phil's sports loyalty is purely with the Wolfpack.

Phil is newly married to Jennifer, a fellow Wolfpack Alumni. They enjoy attending Wolfpack football games, going to the beach (fishing), exercising, and working on projects around the house. Phil and Jennifer's other best friends are Brandy and Sunshine, two Golden Retrievers. Brandy and Sunshine are sisters who love to eat, wrestle, run, and bark at night.

## Recent Staff Additions

*The Office of Natural Environment would like to welcome Jerry Parker and Erika Mortenson.*



Jerry Parker, was a Coastal Management Representative in Wilmington, North Carolina. On July 8, 2002 Jerry joined the Office Of Natural Environment as an Environmental Specialist in the TIP Project Management Team. Jerry currently resides in Greensboro with his wife Deborah and their new born, Sydney.



Erika Mortenson was hired as an ecologist with FHWA in February of 2001 to participate in their Professional Development Program. This program is designed to allow participants to learn about the agency by working 1-6 month assignments in various FHWA offices and state DOT offices. Working with the Office of Natural Environment is her final assignment before her permanent placement in FHWA's New York Division Office, starting October 8.

*Detour Answer: If feasible, NCDOT Highway Planning Engineers would likely choose D. Provide adequate wildlife crossings, overpasses, and fences to protect wildlife.*

### Contact Information

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<http://www.ncdot.org/planning/pe/naturalunit/>

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### Our Mission Statement

Each of the teams in the Office of Natural Environment is responsible for natural resource investigations, obtaining environmental permits, developing wetland and stream mitigation plans, and implementing the construction of mitigation sites.

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